



## North Well Directional Waverider Buoy

<b>Location</b>			
OS	565972 E 354111 N		
WGS84	Latitude: 53° 03.51' N Longitude: 00° 28.51' E		
<b>Instrument type</b>			
Datawell Directional Waverider Mk III			
<b>Water depth</b>	~31m CD	Example buoy in situ. Photo courtesy of Fugro Marine GB Limited	Location of buoy (Google mapping, image ©2019 Landsat / Copernicus)

## Data Quality

<b>Recovery rate (%)</b>	<b>Sample interval</b>
54	30 minutes

## Monthly Averages - 2018

All times are GMT

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	-	-	-	-	5.2	-	0
February	-	-	-	-	4.4	-	0
March	-	-	-	-	3.9	-	0
April	-	-	-	-	-	-	0
May	0.81	5.0	3.7	35	12.4	-	9
June	0.48	5.0	3.6	55	15.1	-	14
July	0.41	3.8	3.2	112	18.5	-	24
August	0.41	3.6	2.9	148	18.9	-	30
September	0.59	4.0	3.1	158	16.1	-	30
October	0.75	4.6	3.4	114	13.4	-	31
November	0.69	4.4	3.3	135	10.2	-	26
December	0.55	4.5	3.2	147	7.9	-	31

## Monthly Averages - All Years (September 2006 – December 2019)

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	0.72	4.6	3.4	135	5.6	-
February	0.64	4.8	3.5	117	5.1	-
March	0.62	4.7	3.5	113	6.0	-
April	0.59	4.7	3.4	97	8.5	-
May	0.61	4.5	3.4	101	11.5	-
June	0.55	4.5	3.4	96	14.4	-
July	0.50	4.2	3.2	124	16.9	-
August	0.53	4.0	3.1	140	17.6	-
September	0.59	4.4	3.3	125	16.1	-
October	0.67	4.5	3.3	131	13.6	-
November	0.76	4.7	3.5	134	10.3	-
December	0.75	4.6	3.4	149	7.2	-

## Storm Analysis

Date/Time	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	Water level elevation* (OD)	Tidal stage (hours re. HW)	Tidal range (m)	Tidal surge* (m)	Max. surge* (m)
21-Sep-2018 01:30:00	2.28	5.9	5.0	224	0.45	HW -3	3.00	-	-
27-Oct-2018 15:00:00	2.28	5.7	4.3	20	-2.65	HW +6	5.90	-	-
20-Nov-2018 02:30:00	2.19	8.7	5.0	83	1.95	HW -1	3.70	-	-

\* Tidal information is obtained from the predicted tide levels (Admiralty Total Tide).

## Annual Statistics

Year	Annual H <sub>s</sub> exceedance** (m)						Annual Maximum H <sub>s</sub>	
	0.05%	0.5%	1%	2%	5%	10%	Date	A <sub>max</sub> (m)
2006	2.24	1.86	1.68	1.59	1.38	1.16	07-Dec-2006 20:00:00	2.38
2007	2.53	2.20	1.98	1.73	1.45	1.19	18-Jan-2007 15:00:00	3.03
2008	2.62	2.03	1.83	1.69	1.44	1.17	22-Mar-2008 04:00:00	2.94
2009	2.83	2.01	1.83	1.65	1.38	1.12	17-Dec-2009 21:00:00	3.19
2010	2.41	2.05	1.94	1.79	1.51	1.22	01-Dec-2010 16:30:00	2.48
2011	2.00	1.61	1.51	1.40	1.22	1.05	13-Dec-2011 20:00:00	2.27
2012	2.36	2.03	1.82	1.56	1.31	1.08	27-Oct-2012 05:00:00	2.58
2013	2.59	2.13	1.89	1.70	1.36	1.15	10-Oct-2013 21:00:00	3.01
2014	2.33	1.91	1.70	1.50	1.22	1.04	15-Feb-2014 06:00:00	2.40
2015	2.57	1.84	1.69	1.52	1.26	1.07	21-Nov-2015 08:30:00	3.21
2016	2.44	2.00	1.88	1.60	1.33	1.08	31-May-2016 09:30:00	2.61
2017	3.08	2.73	2.59	2.39	2.05	1.76	01-Dec-2017 03:30:00	3.13
2018	2.24	1.86	1.70	1.56	1.27	1.04	21-Sep-2018 01:30:00	2.28
2019	2.33	1.86	1.74	1.53	1.27	1.07	11-Jun-2019 02:00:00	2.52

\*\* i.e. 5 % of the H<sub>s</sub> values measured in 2006 exceeded 1.38 m

## Significant wave height return periods

Return periods for significant wave height can be calculated since the buoy has been deployed for more than 5 years. The return periods are based on 0.5 hourly records and are calculated for periods up to 10 times the record length using a peaks-over-threshold method and Generalised Pareto Distribution (GPD).

Observation period	September 2006 to December 2019	
Return period (years)	Significant wave height (m)	Comments
0.25	2.18	No depth limitation
1	2.60	
2	2.79	
5	3.01	
10	3.17	
20	3.31	
50	3.47	
100	3.59	

## Distribution plots

The distribution of wave parameters are shown in the accompanying graphs/tables of:

- Annual time series of  $H_s$  (red line is 2.18 m storm threshold)
- Incidence of storm waves for 2018. Storm events are defined using the Peaks-over-Threshold method. The highest  $H_s$  of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of  $H_s$ ,  $T_p$ ,  $T_z$  and Direction for 2018
- Wave rose (percentage of occurrence of direction vs.  $H_s$ ) for all measured data
- Joint distribution of all parameters for all measured data, given as percentage of occurrence

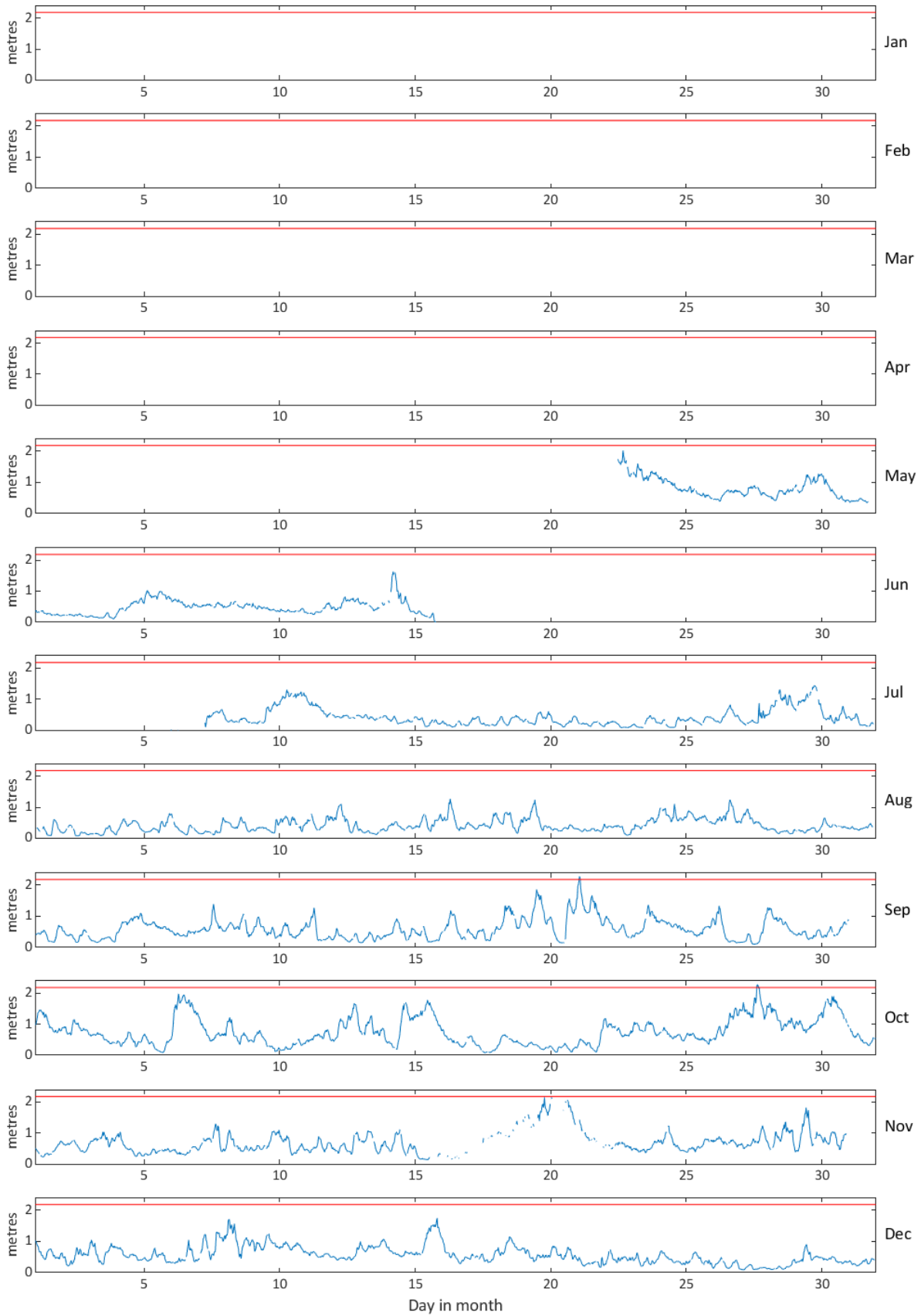
## General

The buoy, owned by the Environment Agency, was first deployed on 25 September 2006, at which time the magnetic declination at the site was 2.38° west, changing by 0.14° east per year.

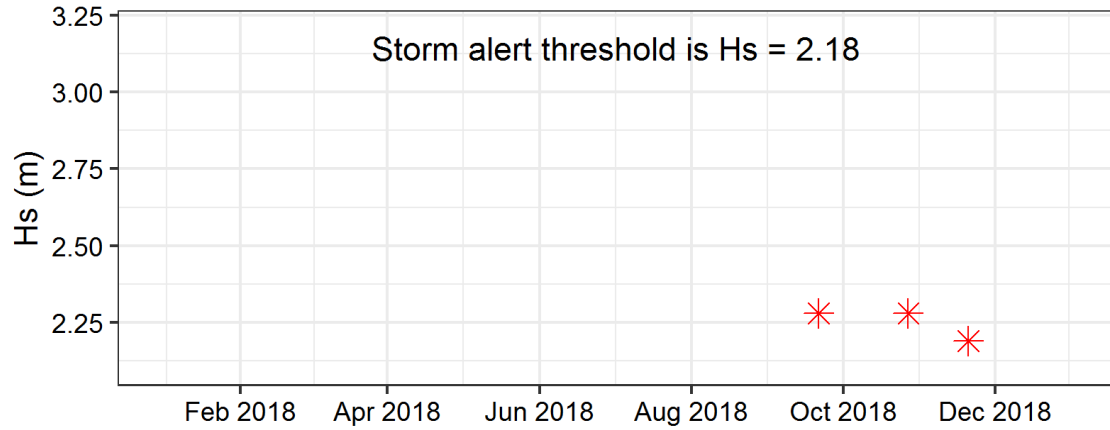
## Acknowledgements

The shore station is kindly hosted by Mablethrope RNLI Lifeboat Station.

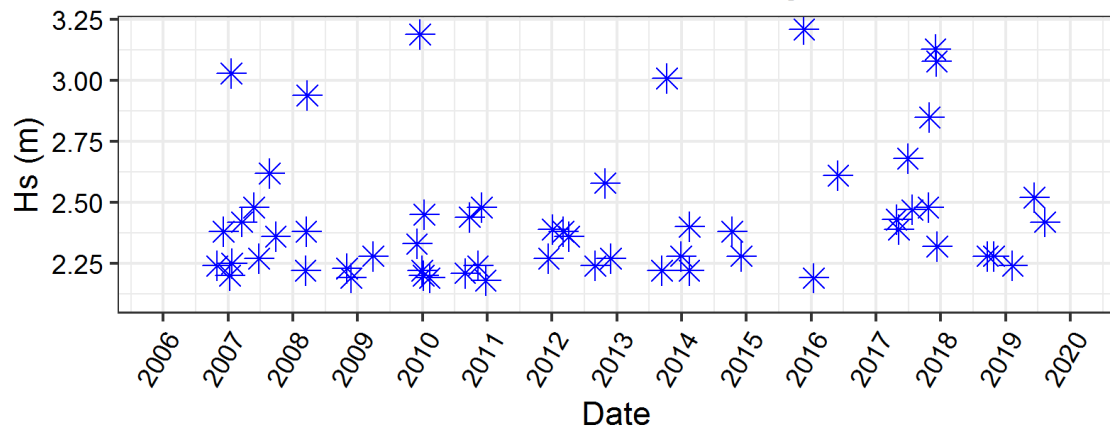
### North Well - Significant Wave Height (Hs) during 2018



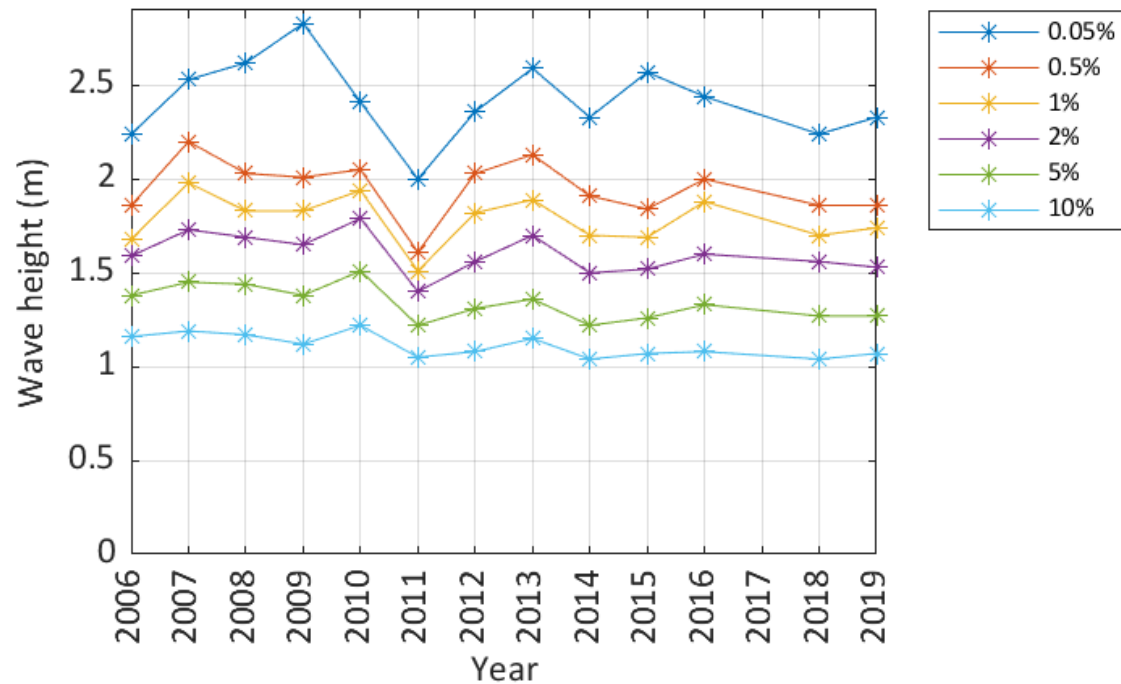
### Storms at North Well during 2018



### Storms at North Well - all years

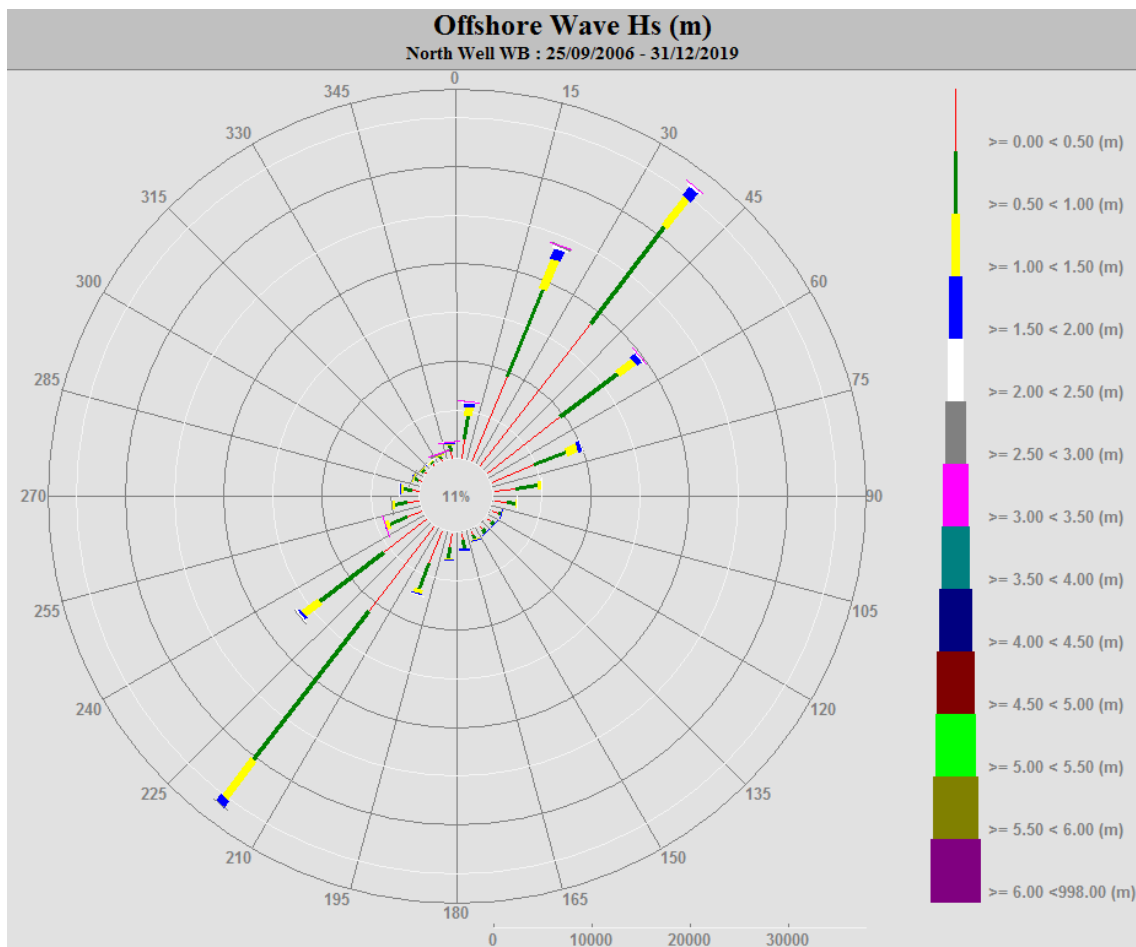
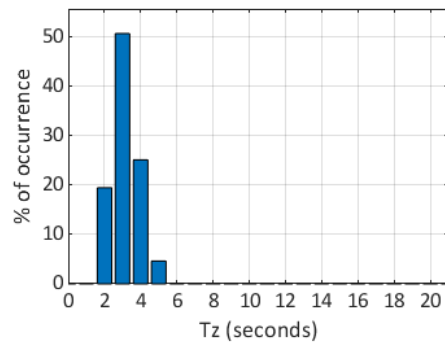
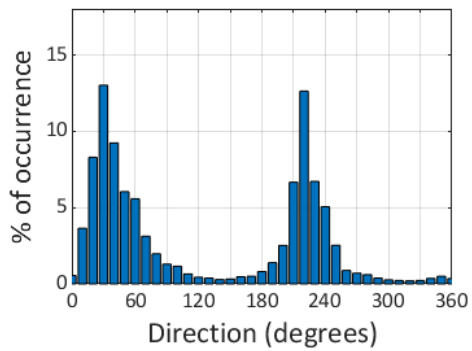
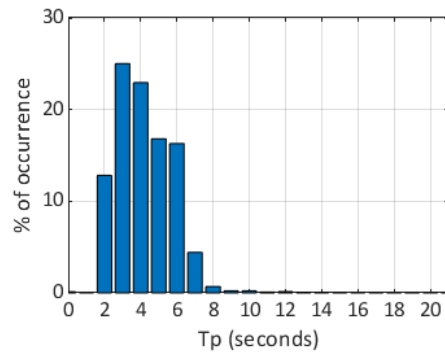
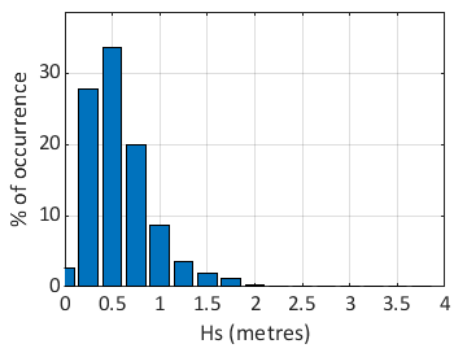


### North Well - Wave height exceedance ( $H_s$ )



2017 was excluded from the wave height graph. During this year, a large number of storms (12) that exceeded the storm alert threshold were recorded, while only 30% of the total annual dataset was recovered, resulting in a very skewed picture. Nonetheless, 2017 should be considered as a year with very high wave heights.

### North Well 2018



North Well 2006 to 2019 - Joint distribution (% of occurrence)

